

United States Government

Department of Energy
Portsmouth/Paducah Project Office

memorandum

DATE:

AUG 12 2005

PPPO-01-402-05

REPLY TO
ATTN OF:

WEM
William E. Murphie, Manager, Portsmouth/Paducah Project Office

SUBJECT:

**RELEASE LIMITS FOR HYDROFLUORIC ACID AND CALCIUM FLUORIDE FROM
DEPLETED URANIUM HEXAFLUORIDE (DUF₆) CONVERSION**

TO: Andrew Wallo III, Director, Office of Air, Water and Radiation, EH-41

This memorandum provides for the Office of Environment, Safety and Health's (EH) review of the required information supporting approval for release of property with residual radioactive material as specified in DOE Guide 441.1-xx. The Portsmouth/Paducah Project Office (PPPO) intends to authorize the unrestricted release of aqueous hydrofluoric acid (HF) produced at depleted uranium hexafluoride (DUF₆) conversion plants at Portsmouth, Ohio and at Paducah, Kentucky when total trace uranium contamination is at a concentration equal to or less than 3pCi/ml in the hydrofluoric acid. The authorized release limit for total trace uranium contamination of 3pCi/ml results in conservative estimates for the annual dose to maximally exposed individuals of 0.145mrem/year and the collective public dose equivalent of 5.2×10^{-4} person-rem/year. This release limit is equivalent to the limit evaluated by the Nuclear Regulatory Commission (NRC) for release of HF from the fuel fabrication facility operated by Framatome ANP, Inc. in Richland, WA, resulting in a Finding of No Significant Impact. Operating experience at the Richland, WA, facility has not shown detectable uranium in the HF product above background levels. Consistent with the NRC requirement, the average uranium concentration in the HF produced at the DUF₆ conversion plants will not exceed 3pCi/ml in any batch of 10,000 gallons.

Background

Uranium Disposition Services, LLC, (UDS) has been selected by Department of Energy (DOE) for disposition of the DUF₆ that has been stored at sites in Paducah, Kentucky, Portsmouth, Ohio, and Oak Ridge, Tennessee. UDS is a limited liability corporation whose partners are Framatome ANP Inc., Duratek Federal Services Inc., and Burns and Roe Enterprises Inc. The DUF₆ is a co-product of uranium enrichment employed to make uranium suitable for fabrication into fuel for nuclear reactors or in national security applications. About 700,000 metric tons of DUF₆ are stored in approximately 63,000 steel cylinders at the three sites.

For conversion, UDS will use Framatome ANP's continuous dry conversion process, in which DUF₆ is vaporized and converted to uranium oxide (predominantly U₃O₈) in fluidized bed conversion units. The conversion to an oxide is accomplished through the reaction of DUF₆ vapor with steam and hydrogen. Hydrogen fluoride is produced as a product in the form of a 55% solution of HF in water (hydrofluoric acid).

DOE has approved the UDS Conversion Product Management Plan (DUF₆-UDS-PLN-004 Revision 0, September 26, 2003) that calls for sale of the hydrofluoric acid. HF will be sold to avoid costs of neutralizing the acid and disposing of the neutralization product, as well as providing revenue to offset operating costs of conversion. DOE Order 5400.5 and its

accompanying guide, DOE G 441.1-xx, describe the process that DOE must use to develop and authorize limits on the contained radioactive contamination (release limits) that may be present in the HF that is to be sold.

Requirements Summary

In accordance with DOE Order 5400.5 and the expedited approval process for authorized limits in Section 7.1 of DOE G 441.1-xx, authorized limits for release of residual radioactive material in mass or volume may be derived and approved by the DOE-PPPO manager without written approval of the Assistant Secretary for Environment, Safety and Health if all the following conditions are met:

1. The release of the subject material will not cause a maximum individual dose to the public in excess of 1mrem per year or a collective dose of more than 10 person-rem in a year.
2. A procedure is in place to ensure records of release are maintained consistent with DOE Order 5400.5 requirements.
3. The following materials are presented to the Office of Environment, Safety and Health at least 45 working days before the authorized limits become effective:
 - a. A copy of the authorized limits,
 - b. Measurement protocols and procedures,
 - c. Supporting documentation, including a statement that the As Low As Reasonably Achievable (ALARA) process requirements have been achieved,
 - d. Appropriate material documenting any necessary coordination with the States or NRC.

EH will notify PPPO within 30 days of receipt of this authorization package if the authorized limits or supporting material are incomplete or unacceptable. If notice of incompleteness or unacceptability is not received within 30 days, the authorized limits may be considered approved without written approval from the Assistant Secretary of Environment, Safety, and Health.

All of the prescribed conditions for expedited approval have been met and documentation is included in this authorization package. This memorandum specifies the authorized limits (referenced above) for the unrestricted release of the hydrofluoric acid and meets the condition 3a above.

Supporting Documents Provided

Documents supporting the selection and approval of the authorized limits are included as attachments to this correspondence. The list is as follows:

Attachment 1 DUF6-G-Q-STU-001 Revision 3, July 2005, *ALARA Analysis Supporting Approval of Authorized Limits For Unrestricted Release of Hydrogen Fluoride*. Table 4-6 of this document shows that condition 1 (maximum annual dose is less than 1 mrem and collective dose is less than 10 person-rem) for expedited approval is met.

- Attachment 2 UDS Procedures UDS-LOP-016, UDS-LOP-017, UDS-LOP-018, and UDS-LOP-019 for measurement and release of hydrofluoric acid produced during DUF6 conversion. These procedures meet condition 2 (ensure that release records are maintained) and condition 3.b (measurement protocols and procedures).
- Attachment 3 Letters from J. R. Hightower to William E. Murphie (with attachments), June 29, 2004 and Jack Zimmerman, July 19, 2005, *Evaluation of UDS ALARA Analysis, DUF₆-G-Q-STU-001*. This provides the certification that ALARA requirements are met, which satisfies condition 3.c for expedited approval.
- Attachment 4 Documentation of Coordination with (1) NRC, (2) Kentucky Department of Environmental Protection, and (3) the Ohio Department of Health Bureau of Radiation Protection. Documentation includes: Telephone and email communication with the NRC, and Meeting Minutes and Presentations with the States. This documentation satisfies condition 3.d.
- Attachment 5 Letter from H. Avci to William Murphie (with attachment), June 8, 2004, *Public participation regarding free release of aqueous HF and CaF₂ products from the conversion of the U.S. Department of Energy's depleted uranium hexafluoride inventory*. This letter documents the extent of public participation in the release process and contributes to meeting condition 3.d.
- Attachment 6 DOE Independent Verification Plan. This plan is not a condition for expedited approval, but is required by DOE Order 5400.5, and is included here for completeness. It is formally included in project documents as an appendix to the Project Execution Plan.

cc:

J. Rispoli, EM-1

C. Anderson, EM-2

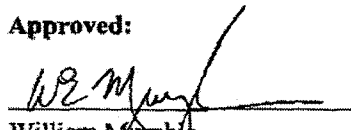
Dr. I. Triay, EM-3

Paducah/Portsmouth DUF₆ Conversion Facilities

Authorized Limits for Unrestricted Release
of AqHF Generated During DUF₆
Conversion Operations


Signature Page

Approved:


William Murphy
Manager, PPPO

8/12/05
Date

Concurrence:


Andrew Wallo III
Supervisory Physical Scientist,
Office of Air, Water and Radiation, EH-41

10/20/05
Date